

Claims

- [c1] A method of reallocating buffer memory, the method comprising steps of:
- allocating memory into at least a first portion and a second portion;
 - creating a buffer pool in the first and second portion, each buffer in the first portion being substantially equally sized and associated with a predetermined packet size and each buffer in the second portion being substantially equally sized and associated with another predetermined packet size;
 - monitoring usage of buffers in each of the first and second portions to determine whether the number of occupied buffers in at least one of the first and second portions crosses a threshold; and
 - triggering a reallocation of the memory of the first and second portions when the number of occupied buffers in at least one of the first and second portions crosses a threshold.
- [c2] The method of claim 1, further comprising the step of reallocating one or more buffers from the first portion to the second portion

when the number of occupied buffers in the second portion crosses the threshold to provide additional buffer memory to the second portion for more efficient memory utilization.

- [c3] The method of claim 2, wherein the one or more buffers from the first portion are contiguous.
- [c4] The method of claim 2, wherein the reallocating step includes reserving one or more occupied buffers until all reserved occupied buffers become unoccupied.
- [c5] The method of claim 4, wherein the reserving step includes starting a reallocation timer to wait until all reserved occupied buffers become unoccupied before completing the reallocation.
- [c6] The method of claim 1, wherein the size of any buffer in the second portion is an integer multiple of the size of any buffer in the first portion.
- [c7] The method of claim 1, further comprising the step of maintaining a packet history to determine whether a new memory allocation is required based on statistical changes in packet sizes received by a network device.
- [c8] The method of claim 1, wherein the creating step includes creating at least one of a link list structure, a list,

and a bitmap to manage all buffers

[c9] The method of claim 1, wherein:

- the first portion has small buffers associated with a first range of small packet sizes of the predetermined packet size and the second portion has larger buffers associated with a second range of large packet sizes of the another predetermined packet size;
- and further comprising:
- monitoring usage of buffers in the first portion and the second portion as packets are received;
- reallocating one or more small buffers to the second portion to create a new larger buffer when the amount of occupied larger buffers in the second portion crosses a threshold; and
- reallocating a large buffer to the first portion to create multiple smaller buffers when the amount of occupied buffers in the first portion crosses a threshold thereby providing more efficient use of memory.

[c10] The method of claim 9, wherein the reallocating step includes reserving one or more contiguous small buffers until all reserved one or more of the contiguous small

buffers become unoccupied.

[c11] The method of claim 10, wherein the reserving step includes preventing new packets from using the one or more contiguous small buffers until the new larger buffer is created.

[c12] A system for a network device that receives packets of variable length, comprising:

- a memory having a first portion and a second portion, the first portion storing packets having a length less than a predetermined value and the second portion storing packets greater than a predetermined value; and
- a memory system reallocating the memory of the first portion and the second portion when the memory of at least one of the first portion and the second portion crosses a threshold.

[c13] The system of claim 12, wherein the first portion of memory contains multiple buffers, each buffer of the first portion sized to store one packet that has a length less than the predetermined value and the second portion of memory contains multiple buffers, each buffer of the second portion sized to store one packet that has a length greater than the predetermined value.

- [c14] The system of claim 12, wherein at least one of the first portion and the second portion stores packets having a length equal to the predetermined value.
- [c15] The system of claim 12, wherein the first portion contains multiple buffers of a first size and the second portion contains multiple buffers of a second size, the second size being a multiple of the first size.
- [c16] The system of claim 12, wherein the memory system re-allocates first sized buffers and second sized buffers wherein the first sized buffers are smaller than the second size buffers and the memory system reallocates more than one first sized buffer to create a new second sized buffer when the predetermined threshold is crossed.
- [c17] The system of claim 12, wherein the memory system re-allocates first sized and second sized buffers wherein the first sized buffers are smaller than the second size buffers and the memory system reallocates one second sized buffer to create a more than one new first sized buffers when the predetermined threshold is crossed.
- [c18] The system of claim 12, wherein the memory system re-allocates buffers in the first portion and the second portion that includes reserving one or more occupied

buffers in at least one of the first and second portion until all reserved occupied buffers in the at least one of the first portion and the second portion are unoccupied.

- [c19] The system of claim 18, wherein the memory system starts a reallocation to wait until all reserved occupied buffers in the at least one of the first portion and the second portion are unoccupied before completing the reallocation.
- [c20] The system of claim 18, wherein the memory system uses a table to track the one or more occupied buffers in a reserved area.
- [c21] The system of claim 20, wherein the table is checked at regular time intervals to determine that all buffers in the reserved area are free.
- [c22] The system of claim 20, wherein the table is searched to determine that all buffers in the reserved area are free, and the search is stopped when a first occupied entry is found, and resumes when the found first occupied entry is removed.
- [c23] The system of claim 18, wherein the memory system uses a table to track unoccupied buffers in a reserved area, and checks the table to determine that all buffers in the reserved area are free

[c24] A computer program product comprising a computer usable medium having readable program code embodied in the medium, the computer program product includes:

- a first computer program code to allocate memory into at least a first portion and a second portion;
- a second computer program code to create a buffer pool in the first and second portion, each buffer in the first buffer pool being equally sized and associated with a predetermined packet size and each buffer in the second buffer pool being equally sized and associated with another predetermined packet size;
- a third computer program code to monitor usage of buffers in each buffer pool to determine whether the unused buffers in either buffer pool falls below a threshold; and
- a fourth computer code to trigger a reallocation of memory when the unused buffers in either buffer pool falls below a threshold.